MERCURY MEASURING STATIONS WORK PLAN

Prepared for

COLUMBIA GAS TRANSMISSION CORPORATION
Charleston, West Virginia

March 1997
Revised April 1997

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TABLE OF CONTENTS

Note: Refer to the ASAWP Reference Document for the following items:

- **FIELD TASKS**
- **SAMPLING AND ANALYSIS PLAN (SAP)**
- **HEALTH AND SAFETY PLAN (HASP)**

Note: Refer to the Characterization Work Plan (WESTON, approved July 1996) for the following items:

- **STANDARD OPERATING PROCEDURES (SOPs)**
- **QUALITY ASSURANCE PROJECT PLAN (QAPP)**
- **SAFETY, HEALTH, AND EMERGENCY RESPONSE PLAN (SHERP)**

LIST OF ACRONYMS

AOC	Administrative Order by Consent
ARARs	applicable or relevant and appropriate requirements
Columbia	Columbia Gas Transmission Corporation
CWP	Characterization Work Plan
EPA	U.S. Environmental Protection Agency Region III
FCS	Facility Conditions Survey
GPS	global positioning system
HASP	Health and Safety Plan
mg/kg	milligrams/kilogram
MMSWP	Mercury Measuring Stations Work Plan
MPRP	most probable release point
ppm	parts per million
PSA	Passive Screening Assessment
QAPP	Quality Assurance Project Plan
RAC/FR	Response Action Completion/Final Report
RAWP	Response Action Work Plan
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SHERP	Safety, Health, and Emergency Response Plan
SOPs	Standard Operating Procedures
TSD	treatment, storage, and disposal
WSL	Work Scope List

SECTION 1

INTRODUCTION

This Mercury Measuring Stations Work Plan (MMSWP) is submitted to meet the requirements of Sections 8.5, 8.6, 8.7, and 8.8 of the Administrative Order by Consent (AOC) for Removal Actions entered into by Columbia Gas Transmission Corporation (Columbia) and the U.S. Environmental Protection Agency Region III (EPA). Per the AOC, Columbia is required to submit to EPA a work plan for assessing remote Work Scope List (WSL) sites (mercury measuring stations [MMSs], liquid removal points [LRPs], and storage wells), a work plan for characterizing remote WSL sites, and a work plan for response actions as these remote WSL sites require remediation. As discussed later in Section 3, Columbia is submitting to EPA this combined assessment, characterization, and response action work plan that describes an expedited program for addressing Columbia MMSs. This MMSWP is one of four work plans that will be submitted to EPA under the AOC for the assessment and remediation of remote WSL sites, not removed by implementation of the Passive Screening Assessment (PSA) pursuant to Section 8.4 of the AOC.

In January 1996, Columbia submitted the Revised Draft Active Screening Assessment Work Plan (ASAWP) applicable to all of the WSL remote sites. EPA and certain state agencies conceptually agreed with the methods proposed in the Revised Draft ASAWP, but expressed concerns over certain technical aspects proposed by Columbia. The primary concerns centered around issues involving the assessment of LRPs. However, EPA took no exception with the plan developed for MMSs in the Revised Draft ASAWP.

In an effort to resolve the outstanding issues and to gather general characterization data for the remote sites, Columbia conducted a pilot study aimed at characterizing selected MMSs and LRPs on a portion of its gathering system. The results of the pilot study are presented in the ASAWP Pilot Study Report (dated December 1996) and include data collected from 242 MMSs and 1,767 LRPs. Through evaluation of the pilot study data and subsequent discussions with EPA it was determined that instead of submitting a single ASAWP for all of the remote sites,

individual work plans would be submitted for each of the following: MMSs, Transmission/Storage Line LRPs, Gathering Line LRPs, and Storage Wells. In addition, a Reference Document that supports all four plans also would be prepared and submitted to EPA for review and approval. The Reference Document contains the Sampling and Analysis Plan (SAP), Field Tasks, and the Health and Safety Plan (HASP).

The objective of this MMSWP is to present Columbia's approach to conduct characterization and response actions concurrently at MMSs in a technically sound and cost-effective manner. Columbia believes a single work plan that addresses both characterization and remediation is appropriate because MMSs along its pipeline are very similar in terms of physical characteristics, operation, and the potential for mercury contamination. The results of the pilot study demonstrate these facts, showing that 62% of MMSs sampled had concentrations of mercury above 20 parts per million (ppm) (action levels are discussed in Subsection 3.2). In discussions with EPA, Columbia expressed the belief that the results of the Pilot Study are representative of remaining MMS population, and further expressed the desire to proceed with characterization and remediation activities concurrently. This MMSWP was developed with the mutual agreement of Columbia and EPA that such an expedited program could be implemented within the current structure of the AOC.

SECTION 2

BACKGROUND

2.1 MMS DESCRIPTIONS

The Columbia pipeline system, which began at the turn of the century, has evolved through periods of acquisition and construction. This system includes approximately 3,000 current and former MMSs. MMSs consist of meters and recording devices that measure the flow of natural gas and appurtenant housing that protects the measurement equipment. The various types of MMSs and associated potential release mechanisms are presented below.

Elemental mercury is used as a measuring medium in some orifice meters, which measure the differential gas pressure across an orifice plate that is located directly in the gas stream. An MMS may consist of single or multiple meters commonly housed in buildings (small wooden or block structures ranging in size from approximately 5' x 5' to 20' x 20') although some are free-standing. The buildings that house meters have concrete, gravel, soil, or wood flooring.

Releases of mercury to the environment may occur as a result of performing periodic maintenance, operating failure, or meter removal. Since elemental mercury has a high bulk density, low solubility, and is relatively inert upon entering the environment, it is most likely that released mercury would be found at or near the ground surface directly under the source, depending upon soil matrices. The most probable release point (MPRP) of mercury depends primarily on whether the meter is located in a building and the type of flooring. In buildings with gravel floors, it is likely that mercury released would be present in the soils directly under the meter at the soil/gravel interface. In buildings with wooden floors, mercury released inside the building could be swept, or tracked, outside of doorways or could potentially move through cracks in the flooring to the soils below. In buildings with concrete floors, any mercury released could be swept, or tracked, outside of doorways where it could move into the surface soils. For mercury meters located outside, it is likely that any mercury released would fall directly beneath the meter onto the soil. Once mercury comes in contact with the soil, the potential for further

movement is significantly reduced (depending upon soil matrices). Sampling locations for each of these MMS types are described in the ASAWP Reference Document SAP.

2.2 PREVIOUS STUDIES

Columbia has conducted two environmental investigations at MMSs. The first investigation, between July 1993 and August 1994, involved assessments of mercury contamination conducted at 34 former and current measuring stations, primarily in West Virginia, Kentucky, and Pennsylvania, all located outside compressor station boundaries. These assessments were performed as part of construction activities along the pipeline. Surface soil samples were collected at all sites. Two shallow soil samples were collected at one of the sites. Mercury was detected in samples from 28 of the 34 sites. Columbia used a cleanup action level of 20 milligrams/kilogram (mg/kg) for this program. Of the 28 sites with mercury detections, 12 had concentrations greater than 20 mg/kg, and contaminated soil was removed. Analytical results from each site are presented in Table 1, in the Tables Section of this MMSWP.

The second investigation was the Pilot Study described in Section 1, conducted between April 1996 and October 1996. The Pilot Study was conducted in accordance with the AOC and the Revised Draft ASAWP and included the assessment of 242 MMSs in southwestern West Virginia. An average of 5.6 samples were collected from each site. Mercury was detected in samples from 225 of the 242 sites assessed. Of the 225 sites where mercury was found, 149 had mercury concentrations greater than 20 mg/kg. The table below presents the range of concentrations detected in both of the previous investigations.

Summary of Mercury Concentrations in Soils

Previous Investigations

Concentration (mg/kg)	Number of Sites 1996 Pilot Study	Number of Sites 1993-1994 Assessment
<20	76	16
20-200	97	6
200-2,000	42	5
2,000-20,000	1	0
20,000-500,000	8	1
>500,000	1	0

SECTION 3

CHARACTERIZATION AND REMEDIATION APPROACH

3.1 GENERAL APPROACH

The approach for this MMSWP involves a combined program of closely coordinated characterization and remediation activities. At each MMS, Columbia will collect site-specific data, including observations and soil samples, to determine the need for and scope of remediation. If site observations and analytical results indicate no mercury concentration above the action level, an Active Screening Assessment Report (ASAR) will be prepared and submitted to EPA for removal of the MMS from the WSL. If visible mercury or analytical results indicate mercury concentrations above the action level, the site will be remediated. Upon receipt of confirmation analytical data, a Response Action Completion/Final Report (RAC/FR) will be prepared and submitted to EPA for review and approval. This combined assessment/ characterization/response action approach is conducted in lieu of a sequential approach of assessment of all MMSs followed by a Characterization Report and subsequent Response Action Work Plan (RAWP). EPA agrees this approach is permitted under Sections 8.6(b)(2), 8.6(c)(2)(k), and 8.7 of the AOC.

3.2 CLEANUP ACTION LEVEL

A cleanup action level of 20 mg/kg total mercury is proposed for this program, except where state action levels require a more stringent standard. This action level is derived from “Examples of Concentrations Meeting Criteria for Action Levels, Federal Register Volume 55 Number 145, July 27, 1990, “Proposed EPA RCRA Correction Action Levels”, July 1990, as well as applicable or relevant and appropriate requirements (ARARs) for individual states in which Columbia operates MMSs.

3.3 CHARACTERIZATION/REMEDIATION ACTIVITIES

Columbia will mobilize several dedicated characterization and remediation teams simultaneously in different work areas. Characterization sampling teams will collect data to determine if mercury contamination is present above the action level, and estimate the extent of contamination. If no mercury is present above the action level, no remediation is required. Remediation teams will excavate and containerize contaminated soils with mercury concentrations greater than 20 mg/kg (or the state level, if lower), collect confirmation samples, backfill excavations with clean material, and restore the site.

Based on the Pilot Study experience, Columbia anticipates encountering the following situations when characterizing MMSs: visible mercury (either observed or through field screening); no visible mercury, but analytical results above action levels; and no visible mercury with no analytical result above action level. These situations are further discussed below along with Columbia's plan to address each situation.

In the first situation, the characterization team will establish the initial grid(s) according to the SAP included in the ASAWP Reference Document, and inspect the MMS for visible mercury. Mercury will be identified either through visual observation or the use of field screening tools. The team will then extend the initial grid (if mercury is detected) and once again inspect for mercury. If no mercury is observed, the team will collect soil samples for laboratory analysis. Through this process the characterization team can estimate the extent of mercury contamination. In addition to soil sampling, the characterization team will complete the Facility Conditions Survey (FCS) and collect site-specific data such as photographs, site sketches, and global positioning system (GPS) coordinates, and other data required by the AOC that are further described in the ASAWP Reference Document. If visible mercury is present or mercury is detected through laboratory analysis above 20 mg/kg (or the state level, if lower), the remediation team will mobilize to the site, remove contaminated soil, and collect soil samples to confirm that action levels are met. Reexcavation and reconfirmation sampling will occur as necessary.

In the second situation, the characterization team inspects the MMS as described above, but finds no visible mercury. The team will then establish a grid around the MPRP and collect soil samples for laboratory analysis. The characterization team will also collect additional site data as described above. If analytical results indicate that mercury is present above the action level, the remediation team will mobilize to the site to remove contaminated soil and collect confirmation samples for laboratory analysis. Reexcavation and reconfirmation will occur as necessary.

In the third situation, the characterization team inspects the MMS as described above, and finds no mercury. The team will establish a grid around the MPRP, collect soil samples for laboratory analysis, and collect additional site data. If analytical results indicate no mercury above the action level, no remediation is required.

All work will be conducted in accordance with the following documents: SAP and Field Tasks included in the ASAWP Reference Document; Quality Assurance Project Plan (QAPP) and Safety, Health, and Emergency Response Plan (SHERP), and Standard Operating Procedures (SOPs) appended to the Characterization Work Plan (CWP) (approved July 1996). It is important to note that active mercury meters will be replaced with non-mercury meters before assessment/ characterization/remediation is conducted. An ASAR or a RAC/FR will be submitted to EPA for all MMSs at which the action levels are met, recommending no further action and removal of the MMS from the WSL.

SECTION 4

REPORTING

4.1 ACTIVE SCREENING ASSESSMENT REPORTS

ASARs will be prepared for each MMS or group of MMSs where no further investigation and no cleanup is warranted, in accordance with Section 8.5(c)(2) of the AOC. The ASARs for all sites addressed under this MMSWP will follow a standard format and will include the following information:

- Map(s) and/or sketches showing the location of the MMS including topographic features around the location and sampling locations.
- Site-specific designations (e.g., number, code, ID) and geographic-specific (latitude, longitude) location of the MMS.
- Copy of site photograph(s) showing equipment and impacted area, if any.
- Results of the FCS, which will include a description of the MMS and a description of the visual inspection or sampling that revealed actual or potential contamination, if any, noting affected ecological zones, and visual observations.
- All chemical concentration data collected during characterization sampling performed pursuant to this MMSWP, including reference to the data collection method, summary data tables, and a copy of the chemical data in computer-readable formats and any readily available data obtained prior to the AOC date.
- Copies of hazardous waste manifests and signed treatment, storage, and disposal (TSD) receipt copies for hazardous wastes shipped from WSL facilities in the course of preparing the ASAR, if any.
- Summary of findings and recommendations for no further action.

4.2 RESPONSE ACTION COMPLETION/FINAL REPORTS

A RAC/FR will be submitted for all MMSs at which a response action was conducted and analytical results confirm that action levels were met. The RAC/FR will serve to meet the requirements of the CWP, characterization report, and remediation report. RAC/FRs may be prepared for a single MMS or groups of MMSs and will be submitted on a monthly basis in accordance with Section 8.8(d) of the AOC. RAC/FRs will include, at a minimum, the following information:

- A detailed description of the work undertaken to implement this MMSWP.
- All data obtained by Columbia to verify the effectiveness of the response action.
- Copies of all hazardous waste manifests and signed TSD receipt copies for hazardous wastes shipped from WSL facilities in the course of preparing the RAC/FR.
- A certification of work by Columbia in accordance with Section 8.12 of the AOC.
- Map(s) and/or sketches showing the location of the MMS including topographic features around the MMS and sampling locations and sketches showing excavation areas.
- Site-specific designations (e.g., ID number) and geographic-specific (latitude, longitude) location of the MMS.
- A description of the MMS, or groups of MMSs, and a history of operations and releases.
- A summary of previous investigations.
- Results of the FCS, which include a description of the MMS, noting affected ecological zones, and visual observations.
- All chemical concentration data collected during sampling performed at the location, including summary data tables and a copy of chemical data in a computer-readable format.
- A summary of all groundwater monitoring data obtained.
- A summary of potentially exposed populations obtained from the FCS.
- Recommendations for no further action.

SECTION 5

SCHEDULE

Columbia anticipates that this MMS remediation program will be completed in 5 years. All identified MMSs will be addressed over this period at a pace of approximately 600 MMSs per year. This schedule may be accelerated based upon Columbia's business needs, e.g., to facilitate facility sales. The ASARs for a particular MMS of groups of MMSs will be provided no later than 2 months after receipt of disposal manifests and final laboratory deliverables. For 1997, characterization and remediation activities will focus on Columbia's gathering system MMSs. It is anticipated that the 149 MMSs identified during the Pilot Study along with a group in Indiana County, Pennsylvania, connected with the sale of a small gathering pipeline, will be addressed first.

TABLES

Table 1

Mercury Concentrations in Soils at Selected Mercury Measuring Stations

Measurement Station Location	Total Mercury Analysis Results (mg/kg)		Source Document Code [1]
Action Level	**20**		
Sample Type	**Discrete**	**Composite**	
Pipeline BM-111 Burlington, OH	0.83 - 40	NT	J
Coco Storage Well 7042 Kanawha County, WV	0.28	NT	A
Coco Storage Well 7046 Kanawha County, WV	ND	NT	A
Coco Storage Well 7058 Kanawha County, WV	ND	NT	A
Coco Storage Well 7062 Kanawha County, WV	0.13	NT	A
Coco Storage Well 7073 Kanawha County, WV	2.0	NT	A
Coco Storage Well 7077 Kanawha County, WV	0.08	NT	A
Coco Storage Well 7105 Kanawha County, WV	ND	NT	A
Coco Storage Well 7108 Kanawha County, WV	0.03 - 0.05	NT	B
Coco Storage Well 7109 Kanawha County, WV	0.06	NT	B
Coco Storage Well 12067 Kanawha County, WV	0.13	NT	G
Coco Storage Well 12076 Kanawha County, WV	0.22	NT	A
Coco Storage Well 12079 Kanawha County, WV	0.27	NT	A
Coco Storage Well 12112 Kanawha County, WV	ND	NT	A
Pipeline A-1 Coopers Plains, NY	2.2	NT	I
Pipeline A-5 Spring Valley, NY	110 - 390	NT	I
Pipeline A-5 West Nyack, NY	22 - 190	NT	I

Table 1

Mercury Concentrations in Soils at Selected Mercury Measuring Stations (Continued)

Measurement Station Location	Total Mercury Analysis Results (mg/kg)		Source Document Code [1]
Action Level	20		
Sample Type	Discrete	Composite	
Pipeline 2 Station 647+36 Roane County, WV	1,100	100	G
Pipeline 2 Station 697+52 Calhoun County, WV	ND	0.29	G
Pipeline 2 Station 772+59 Calhoun County, WV	1,000	140	G
Pipeline 2 Station 1350+98 Calhoun County, WV	50	11	G
Pipeline 2 Station 1353+98 Calhoun County, WV	ND	0.19	G
Pipeline 2 Station 1364+86 Calhoun County, WV	1.5	2.9	G
Pipeline 2 Station 1930+56 Ritchie County, WV	2.3	0.38	G
Pipeline 2 Station 2154+85 Ritchie County, WV	68	45	G
Pipeline 2 Station 2217+75 Ritchie County, WV	ND	2.9	G
Pipeline 2 Station 2517+44 Doddridge County, WV	ND	ND	G
Pipeline V-2 Logan County, WV	ND	NT	K
Pipeline 18494 Station 116+90 Wirt County, WV	1,500	9.4	R
Pipeline 18494 Station 153+81 Wirt County, WV	100	13	R
Pipeline 18497 Station 105+41 Wirt County, WV	24	6.2	R
Pipeline 18497 Station 107+27 Wirt County, WV	170,000	2,700	R
Pipeline 18497 Station 190+20 Wirt County, WV	2.7	0.73	R
Koppel Measurement Station Beaver Falls, PA	0.26 - 820	NT	T

Table 1

Mercury Concentrations in Soils at Selected Mercury Measuring Stations (Continued)

Notes: ND = Not detected.
NT = Not tested.

(1) Source Document Codes are as follows:

A - Coco Storage Facility, Volumes I and II, a.k.a., Environmental Assessments of LRPs, 1994 Construction Reports, Coco Storage Field Well 12067,Rucker and Associates, July 27, 1994.

B - Coco Storage Field Well 7108, Kanawha County, West Virginia, Rucker and Associates, August 1, 1994.

G - Draft Site Sampling Program Report, Meter Locations, West Virginia and Kentucky, SE Technologies, Inc., January 18, 1995.

I - Environmental Assessment Line A-5 Facilities from West Nyack to Ereckson Terrace, Rockland County, New York, Dames and Moore, July 20, 1993.

J - Environmental Assessment Proposed Pipeline BM-111 from Ceredo, West Virginia to Burlington, Ohio, Dames and Moore, July 26, 1993.

K - Environmental Assessments of LRPs, 1994 Construction Projects, Pipeline V-2, Logan Co., West Virginia, Move due to highway construction, Rucker and Associates, June 29, 1994.

R - Environmental Survey, Line 2, Line 18494, and Line 18497, SE Technologies, Inc., June 1, 1994.

T - Pennsylvania Pipeline Liquid Removal Point Sampling Program Report, Terradon Corporation, September 17, 1993.